Listing of Claims:

1. (Previously Presented) A method for forming an underlying film, comprising: irradiating the surface of an insulating film disposed on an electronic device substrate with plasma based on a process gas comprising at least an oxygen atom-containing gas, to thereby form an underlying film at the interface between the insulating film and the electronic device substrate,

wherein the underlying film is an oxide film, and has a thickness of 6-12 Å.

2-5. (Canceled)

6. (Withdrawn) An electronic device material, comprising:

an electronic device substrate,

an underlying film disposed on the substrate, and

an insulating film disposed on the underlying film, wherein the underlying film is a film which has been formed by supplying plasma from the insulating layer side.

7. (Withdrawn) The electronic device material according to claim 6, wherein the insulating film is a film comprising a high-dielectric constant material.

8. (Previously Presented) A method for forming an insulating film, comprising:

forming an insulating film on a substrate,

converting a process gas comprising at least an oxygen atom-containing gas on the insulating film to thereby generate oxygen radicals, and

irradiating the surface of the insulating film with the oxygen radicals so that the oxygen radicals penetrate the insulating film and react with the substrate to thereby form an oxide film at the interface between the insulating film and the substrate,

wherein the oxide film has a thickness of 6-12 Å.

9-10. (Canceled)

11. (Previously Presented) A method for forming an insulating film according to claim 8, wherein the process gas comprises at least one rare gas selected from the group consisting of Kr, Ar, He and Xe.

12. (Previously Presented) A method for forming an insulating film according to claim 8, wherein the oxygen atom-containing gas is O_2 gas.

13. (Previously Presented) A method for forming an insulating film according to claim 8, further comprising annealing the substrate after the formation of the oxide film.

14. (Previously Presented) A method for forming an insulating film according to claim 13, wherein the annealing is conducted in an atmosphere of N_2, O_2, or N_2 and O_2.

15. (Previously Presented) A method forming an insulating film according to claim 13, wherein the annealing is conducted at a temperature of 500-1100°C.

16. (Previously Presented) A method for forming an insulating film, comprising:

forming a high-dielectric constant insulating film on a substrate,

generating plasma based on a process gas comprising at least an oxygen atom-containing gas on the high-dielectric constant insulating film, and

irradiating the surface of the high-dielectric constant insulating film with the plasma to thereby form an oxide film at the interface between the high-dielectric constant insulating film and the substrate,

wherein the oxide film has a thickness of 6-12 Å.

17. (Previously Presented) A method for forming an insulating film according to claim 16, wherein the plasma is generated based on microwave via a plane antenna member (RLSA) having a plurality of slots.

18. (Previously Presented) A method for forming an insulating film according to claim 16, wherein the high-dielectric constant insulating film comprises at least one material selected from the group consisting of Al_2O_3, ZrO_2, HfO_2, Ta_2O_5, ZrSiO, HfSiO and ZrAlO.

19. (Previously Presented) A method for forming an insulating film according to claim 16, wherein the process gas comprises at least one rare gas selected from the group consisting of Kr, Ar, He and Xe.

20. (Previously Presented) A method for forming an insulating film according to claim 16, wherein the oxygen atom-containing gas is O_2 gas.

21. (Previously Presented) A method for forming an insulating film according to claim 16, further comprising annealing the substrate after the formation of the oxide film.

22. (Previously Presented) A method for forming an insulating film according to claim 21, wherein the annealing is conducted in an atmosphere of N_2, O_2, or N_2 and O_2.

23. (Previously Presented) A method for forming an insulating film according to claim 21, wherein the annealing is conducted at a temperature of 500-1100°C.

24-27. (Canceled)

28. (Previously Presented) A method for forming an insulating film according to claim 16, further comprising plasma nitriding the surface of the substrate before the formation of the high-dielectric constant insulating film.

29. (Previously Presented) A method for forming an insulating film, comprising:

forming a HfSiO film on a substrate,

generating plasma based on a process gas comprising at least an oxygen atom-containing gas on the HfSiO film, and

irradiating the surface of the HfSiO film with the plasma, to thereby form an oxide film at the interface between the HfSiO film and the substrate,

wherein the oxide film has a thickness of 6-12 Å.

30. (Previously Presented) A method for forming an insulating film according to claim 29, wherein the plasma is generated based on microwave via a plane antenna member (RLSA) having a plurality of slots.

31. (Previously Presented) A method for forming an insulating film according to claim 29, wherein the oxygen atom-containing gas is O_2 gas and the process gas comprises at least one rare gas selected from the group consisting of Kr, Ar, He and Xe.

32. (Previously Presented) A method for forming an insulating film according to claim 29, further comprising annealing the substrate after formation of the oxide film.

33. (Previously Presented) A method for forming an insulating film according to claim 32, wherein the annealing is conducted in an atmosphere of N_2, O_2, or N_2 and O_2.

34. (Previously Presented) A method for forming an insulating film according to claim 32, wherein the annealing is conducted at a temperature of 600-1100°C.

35. (Previously Presented) A method for forming an insulating film according to claim 29, wherein the substrate is at a temperature from room temperature to 500°C.

36. (Previously Presented) A method for forming an insulating film according to claim 29, wherein the oxide film is formed at a pressure of 3-500 Pa.

37-38. (Canceled)

39. (Previously Presented) A method for forming an insulating film according to claim 29, further comprising plasma nitriding the surface of the substrate before the formation of the HfSiO film.

40. (Previously Presented) A method for forming an insulating film according to claim 29, wherein the HfSiO film is formed by using tertiary ethoxy hafnium (HTB: $Hf(OC_2H_5)_4$) and silane gas (SiH_4).

41. (Previously Presented) A method for forming an insulating film according to claim 29, further comprising washing the substrate before the formation of the HfSiO film.

42. (Previously Presented) A method for forming an insulating film, comprising:

forming a HfSiO film on a substrate,

generating plasma based on a process gas comprising at least an oxygen atom-containing gas on the HfSiO film,

irradiating the surface of the HfSiO film with the plasma to thereby form an oxide film at the interface between the HfSiO film and the substrate, and

nitriding the surface of the HfSiO film,

wherein the oxide film has a thickness of 6-12 Å.

43. (Previously Presented) A method for forming an insulating film according to claim 42, further comprising plasma nitriding the surface of the substrate before the formation of the HfSiO film.

44. (Previously Presented) A method for forming an insulating film according to claim 42, further comprising washing the substrate before the formation of the HfSiO film.

45. (Withdrawn) A semiconductor manufacturing apparatus for forming an insulating film, said apparatus comprising:

a cassette station for disposing a substrate,

a first arm for putting in and out with respect to the cassette,

at least one plasma processing unit for plasma oxidizing or plasma nitriding the substrate, a heating unit for heating the substrate,

a heating reaction furnace for forming a high-dielectric constant film on the substrate,

a transportation chamber for disposing the plasma processing unit and the heating unit,

a second arm disposed in the transportation chamber, for transporting the substrate between the respective units, and

a load lock for conducting the communication/cutoff between the respective processing units.

46. (Previously Presented) A method for forming an electronic device, comprising:

forming a high-dielectric constant gate insulating film on a substrate,

generating plasma based on a process gas comprising at least an oxygen atom-containing gas on the high-dielectric constant gate insulating film,

irradiating the surface of the high-dielectric constant gate insulating film with the plasma, to thereby form an oxide film at the interface between the high-dielectric constant gate insulating film and the substrate, and

forming a gate electrode on the high-dielectric constant gate insulating film,

wherein the oxide film has a thickness of 6-12 Å.

47. (Previously Presented) A method for forming an electronic device according to claim 46, wherein the plasma is generated based on microwave via a plane antenna member.

48-49. (Canceled)

50. (Previously Presented) A method for forming an electronic device according to claim 46, further comprising nitriding the surface of the high-dielectric constant gate insulating film after the formation of the oxide film.

51. (Previously Presented) A method for forming an electronic device according to claim 46, further comprising annealing the surface of the high-dielectric constant gate insulating film after the formation of the oxide film.

52. (Canceled)

53. (Previously Presented) A method for forming an electronic device according to claim 46, wherein the high-dielectric constant gate insulating film comprises at least one material selected from the group consisting of Al_2O_3, ZrO_2, HfO_2, Ta_2O_5, ZrSiO, HfSiO and ZrAlO.

54. (Previously Presented) A method for forming an electronic device according to claim 46, further comprising plasma nitriding the surface of the substrate before the formation of the high-dielectric constant gate insulating film.

55. (Previously Presented) A method for forming an insulating film according to claim 16, further comprising nitriding the surface of the high-dielectric constant gate insulating film after the formation of the oxide film.